

REMARKS/ARGUMENTS

Claims 1 – 9, 12 – 22, 24, 26 – 28, 31 – 33, 36 and 47 – 71 are currently pending and rejected.

The applicants cancel claims 8, 9, 14, 17 – 21, 24, 27, 28, 31 – 33, 36, 55 – 57; add new claims 72 and 73; and amend claims 1, 12, 13, 15, 16, 22, 26, 53, 54 and 58. The applicants do not disclaim the subject matter recited in the cancelled claims, and reserve the right to prosecute the cancelled claims in the future. The new claims 72 and 73 incorporate the amendments proposed by the examiner to overcome the current rejection against claims 1 and 58, in her discussion on 11 June 2009 with the applicant's attorney. The applicants amend claims 12, 13, 15, 16, 22, 26, 53, 54 not to overcome the examiner's rejections but to conform them to their respective, independent claim that they now depend from.

The applicants respectfully assert that claims 1 – 7, 12, 13, 15, 16, 22, 26, 47 – 54 and 58 – 73, as amended, are in condition for allowance for at least the reasons discussed below.

Examiner's verbal objection to the term "isolate" in claim 1

During the discussion on 18 May 2009 between the examiner and the applicant's attorney, the examiner objected to the term "isolate" found in claim 1, and requested that the portion(s) of the specification that supports the use of this term be identified.

The applicants respectfully assert that use of the term "isolate" in claim 1 is supported in paragraphs 17, 26 and 38 of the specification. Paragraph 17 and 26 discuss demodulation of a modified voltage signal (stimulation signal) to remove noise from the modified voltage signal. Paragraph 38 discusses filtering a modified voltage signal (stimulation signal) to remove noise from the modified voltage signal. Because isolating a modified voltage signal from noise and removing noise from a modified voltage signal mean the same thing, use of the term "isolate" in claim 1 is supported by the specification.

Rejection against Claims 1 – 7 and 47 – 52

The applicants respectfully assert that claim 1, as amended, is patentable over U.S. Patents 5,017,134 (Saito), 5,759,159 (Masreliez) and 4,243,388 (Arai) at least because Saito, Masreliez and Arai each fails to disclose a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver.

The applicant's claim 1, as amended, recites in part, a handpiece that includes a dental instrument, a handpiece driver operable to drive the dental instrument via a mechanical coupling between the handpiece driver and the dental instrument, and an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Claim 1, as amended, also recites in part a voltage signal that is used to determine the proximity of the dental instrument to the tooth's apical foramen, and that travels the electrically conductive path.

For example, as shown in FIG. 4 and discussed in paragraphs 43 – 46 and 50 of the specification, the dental instrument may be a file 254 that a dentist uses to ream out or remove material located inside the tooth 216. In operation, a signal generator (52 in FIG. 2) disposed inside the apical foramen locator 240 (FIG. 4) generates a voltage signal. The voltage signal is applied across the series combination of:

- a reference impedance (54 in FIG. 2) disposed inside the locator 240,
- the wire 257 coupling the locator 240 to the handpiece driver 258 that powers the rotation of the file 258,
- the electrically conductive path 256 that includes the mechanical coupling between the handpiece driver 258 and the file 254,
- the file 254,
- the body tissue 220,
- the lip clip 218, and

the wire 211.

By including the electrically conductive path in the series combination, one can avoid having to clip a lead from the locator 240 onto the file 254, and thus avoid clutter around the site of the dental procedure and problems associated with maintaining good electrical contact between the lead and the file 254 as the file rotates. The electrically conductive path, however, also allows electrical noise from the driver and other components of the handpiece to mix with the voltage signal. Because of this the voltage signal must be isolated from the noise before it can be used to determine the proximity of the file to the tooth's apical foramen.

In contrast, Saito fails to disclose a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Saito appears to disclose a system for determining the proximity of a reamer 3 (FIG. 1) by monitoring the change in the difference between the impedance of two different voltage signals. As shown in FIG. 1, the circuitry for performing this function is coupled to the reamer 3 and electrode 5 placed on a patient's lip. The circuitry is not coupled to any portion of the mechanical coupling of the reamer 3 to a driver in the mechanical cutter 2. Therefore, unlike the applicant's claimed apparatus, Saito's system does not include a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver.

Also In contrast, Masreliez fails to disclose a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Masreliez appears to disclose an apical position detector 40 (FIG. 2) that includes a circuit 42 for determining the proximity of a probe 46 to a tooth's end region 64 (apical foramen). The circuit performs this function by monitoring several voltage signals each having different amplitudes and phases, and each applied across a patient's body tissue 66. As shown

in FIG. 1, the circuit 42 is coupled to the probe 46 and to a lip electrode 48. The probe 46 is not mechanically coupled to a driver. Therefore, unlike the applicant's claimed apparatus, Masreliez's system does not include a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver.

Also In contrast, Arai fails to disclose a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Arai appears to disclose a control device 1 (FIG. 2) that includes circuitry (FIG. 3) for determining the proximity of a reamer 7 (FIG. 2) to a tooth's apical foramen "a" (FIG. 4). The circuitry is coupled to the reamer 7 by the terminal 71 (FIGS. 2 and 4) and to the patient by the clip 73 (FIGS. 2 and 4). The circuitry is not coupled to the mechanical coupling between the engine (driver) 32 (FIG. 1) that rotates the reamer 7, and the chuck 35 (FIG. 1) that holds the reamer 7 as the engine 32 rotates it. Therefore, unlike the applicant's claimed apparatus, Arai's system does not include a voltage signal that is used to determine the proximity of a dental instrument to a tooth's apical foramen, and that travels an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver.

Claims 2 – 7, 12, 13, 15, 16, 22, 26 and 47 – 52, as amended, are patentable at least by virtue of their dependencies on claim 1, as amended.

Rejection against Claims 53, 54 and 58 – 71

Claim 58, as amended, is patentable over Saito, Masreliez and Arai for reasons similar to those recited above in support of claim 1 over Saito, Masreliez and Arai.

Claims 53, 54 and 59 – 71 are patentable at least by virtue of their dependencies on claim 58, as amended.

Allowability of Claim 72

The applicants respectfully assert that claim 72 is allowable over U.S. Patents 5,017,134 (Saito), 5,759,159 (Masreliez) and 4,243,388 (Arai) at least because Saito, Masreliez and Arai each fails to disclose a voltage signal that passes through the handpiece driver to the dental instrument.

The applicant's claim 72 recites, in part, a dental instrument operable to remove tissue from a tooth of the patient, a handpiece driver operable to drive the dental instrument via a mechanical coupling between the handpiece driver and the dental instrument, and a signal generator that generates a voltage signal that passes through the handpiece driver to the dental instrument.

In contrast and as discussed in conjunction with claim 1 above, Saito, Masreliez and Arai, each disclose coupling to a patient and to a file, reamer or probe in the patient's tooth, circuitry for determining the proximity of the file, reamer or probe to the tooth's apical foramen. The signal used by circuitry in each of the Saito, Masreliez and Arai systems does not pass through each's handpiece driver to the file, reamer or probe. Thus, neither Saito nor Masreliez nor Arai disclose a voltage signal that passes through the handpiece driver to the dental instrument.

Allowability of Claim 72

Claim 73 is allowable over Saito, Masreliez and Arai for reasons similar to those recited above in support of claim 72 over Saito, Masreliez and Arai.

Conclusion

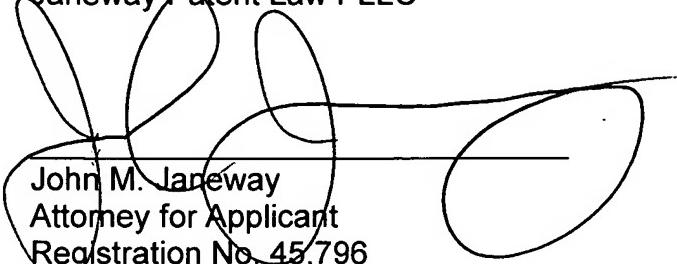
The applicants respectfully request that the examiner withdraw the rejection against claims 1 – 7, 12, 13, 15, 16, 22, 26, 47 – 54 and 58 – 71, and issue an allowance for these and new claims 72 and 73, as amended.

If, after considering this response, the examiner believes the claims should not be allowed, the applicants respectfully request that before issuing an Office Action, the

examiner call the applicants' attorney, Mr. Janeway (206-708- 7705), to schedule a telephone conference to further the prosecution of the claims.

Dated this 1st day of July 2009.

Respectfully submitted,
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